RANDOLPH, TONYA

From: RANDOLPH, TONYA
Sent: Monday, April 06, 2015 8:43 AM
Subject: FW: Boring & Construction Logs for West Vermont
Attachments: WES6_thru_WES9_Construction_Logs.pdf; WES-6_through_WES-9_Boring_Logs.xls; LayneWellsMap.pdf

From: Anderson, Carmen
Sent: Thursday, April 02, 2015 9:00 AM
To: OSBORN, DIANE; JAWORSKI, MARK
Subject: FW: Boring & Construction Logs for West Vermont

Carmen Anderson
Senior Environmental Manager
Remediation Services Branch
Office of Land Quality
Indiana Department of Environmental Management
100 N. Senate Avenue, IGCN N1101
Indianapolis, IN 46204-2551
canderson@idem.in.gov
(317) 234-2513

From: Beodray, Frank [mailto:Frank.Beodray@WestonSolutions.com]
Sent: Wednesday, March 26, 2014 9:48 AM
To: Anderson, Carmen
Cc: lam.shelly@epa.gov
Subject: Boring & Construction Logs for West Vermont

Hi Carmen, Shelly is responding to an oil spill in Ft. Wayne this morning so she asked me to send you this information in preparation for your meeting with Mundell. I included our field notes on well construction showing lithology and where we placed our screens above the upper till and in the lower sand/gravel layer above the lower till. I also included the boring logs for WES-6- WES-9 and a location map showing where our cluster well locations were placed.

Let me know if there is anything else you need for your meeting.

Frank L. Beodray, CPG
Ohio Operations, Cleveland Office Manager

Weston Solutions, Inc.
Building 2, Suite I
6779 Engle Road
Middleburg Hts., Ohio 44130

(440) 202-2806 direct office#
(440) 336-2595 cell

GEOLIS® Well Construction Form

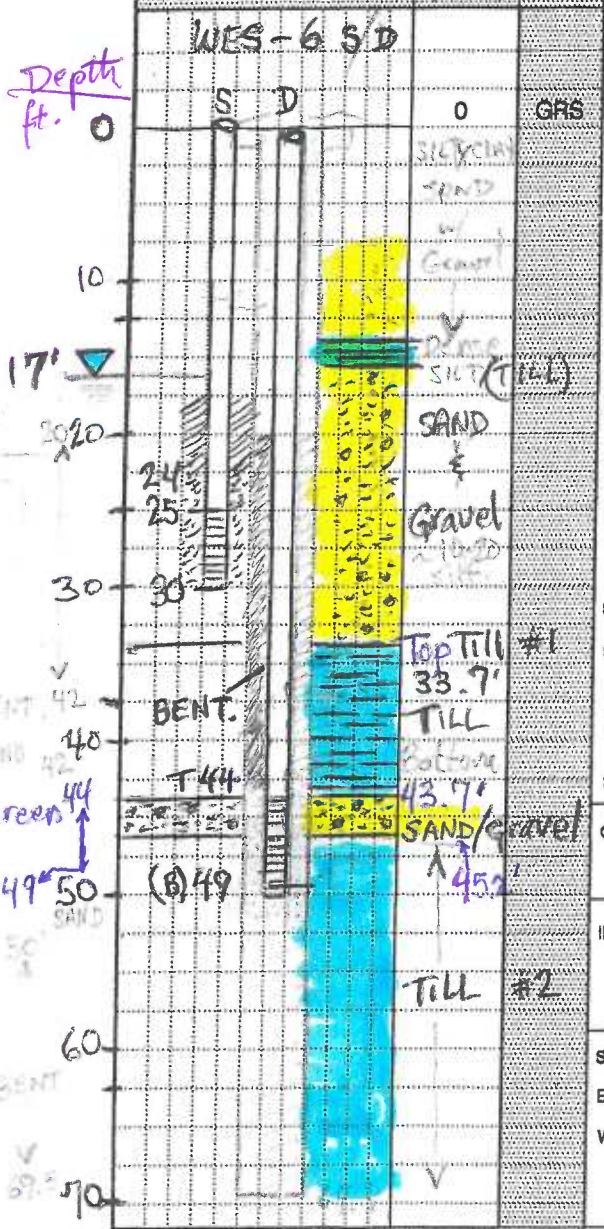
COMPANY: Weston
PROJECT: W. Vermont, IN
PROPERTY: EPA Region 5 START
SITE/AREA: 3938 W. Michigan Ave.

LOCATION ID: WES-6D
DATE: 2/5/2014
LOGGER: S. LAUNDRY
SIGNATURE:

START DATE: 2/3/2014 – 2/5/2014
COMPLETION DATE:
WELL STATUS: PMP - ABN - COL - NOR
STATUS DATE:

SURVEYED ELEVATIONS (MSL)
GROUND LEVEL: FT/M
MEASURING POINT: (TOP OF CASING) FT/M

DEPTH TO WATER / DATE / TIME
WES-6D 16.69 FT/M(TOC) 2/7/2014 08:15
WES-6S 17.35 FT/M(TOC) 2/7/2014 08:12
FT/M(TOC)



WELL TYPE: (SCREEN) - MULT. SCREEN - OPEN HOLE - NESTED - PROBE - LYSIMETER
CASING: SINGLE - DOUBLE - TRIPLE COMPLETION: (FLUSH) - PROT - VAULT - CAP - NA
NUMBER OF SCREENS OR NESTED WELLS: (1) - 2 - 3 - 4 - 5 - OTH:
WELL USE: DOM - PUB - IRR - FIR - (MON) - HYD - EXT - DEW - RCH - VEW - INJ - OTH:

WELL DESIGN CONSTRUCTION

CASING #1 (INNERMOST): DIAMETER: 2 IN/CM INTERVAL: 0 TO 44 FT/M BGS
TYPE: (PVC) - STN - LCS - GAL - SCHEDULE: 5 - 10 - 20 - (40) - 80 -
CASING JOINTS: FLT - BUT - EUT - SOL - WLD - (SCW) - CAM - OTH:

CASING #2: DIAMETER: IN/CM INTERVAL: TO FT/M BGS
TYPE: PVC - STN - LCS - GAL - SCHEDULE: 5 - 10 - 20 - 40 - 80 -

CASING #3 (OUTERMOST): DIAMETER: IN/CM INTERVAL: TO FT/M BGS
TYPE: PVC - STN - LCS - GAL - SCHEDULE: 5 - 10 - 20 - 40 - 80 -

STICK UP: INNER CASING: FT/M OUTER CASING: FT/M

GROUT: TYPE: CMT - (C/B) - BEN - HSB - OTH:
INTERVAL: TO FT/M BGS
PLACEMENT: TRM - PRS - (GRV) CENTRALIZERS: (NON) 1 - 2 - 3 - OTH:

SEAL: TYPE 1: Bentonite Chips INTERVAL: 42 TO 19 FT/M BGS
TYPE 2: Cement/Bent INTERVAL: 0 TO 19 FT/M BGS

SAND PACK: * TYPE: Medium INTERVAL: 42 TO 50 FT/M BGS

SCREEN: DIAMETER: 2 IN/MM INTERVAL: 44 TO 49 FT/M BGS
TYPE: (PVC) STAINLESS - TEFLON - CERAMIC - OTH:
SLOTS: CONTINUOUS - (SLOTTED) HORIZ - SLOTTED/VERT - FIELD CUT
SLOT SIZE: 6 - (10) - 20 - 30 - 40 SLOT IN/MM

SILT TRAP/SUMP: YES - (NO) INTERVAL: 48.7 TO 49.0 FT/M BGS

OPEN HOLE: DIAMETER 1: IN/CM INTERVAL: TO FT/M BGS
DIAMETER 2: IN/CM INTERVAL: TO FT/M BGS

INSIDE WELL T.D.: 49 FT/M BGS COLLAPSE/BACKFILL: COL - BFL - BTH - NON
COLLAPSE INTERVAL: 50 TO 51 FT/M BGS SAND
BACKFILL INTERVAL: 51 TO 69.5 FT/M BGS TYPE: Bentonite Chips

STRAT UNIT MONITORED: SAND/Gravel Beneath 1st → TILL Unit.
ESTIMATED WELL YIELD: GPM/LPM DRAWDOWN: FT/M BMP

WELL PUMPS: YES - NO
TYPE 1: DEPTH: FT/M BMP
TYPE 2: DEPTH: FT/M BMP

COMMENTS: Shallow well installed ~10 ft east of deep well; Screens: 25-30 ft; Sandpack: 24-30 ft; Bentonite: 20-24 ft; C/B grout to surface.

WELL CONSTRUCTION CODES

GRS = GROUND SURFACE	TSC = TOP OF SCREEN
BPC = BOTTOM OF PROTECTIVE CASING	TST = TOP OF SILT TRAP
TBS = TOP OF BENTONITE SEAL	WTD = TOTAL DEPTH INSIDE WELL
TBR = TOP OF BEDROCK	BTD = BOREHOLE TOTAL DEPTH
BOC = BOTTOM OF OUTER CASING	TOC = TOP OF CASING (INNER)
TSP = TOP OF SAND PACK	BGS = BELOW GROUND SURFACE

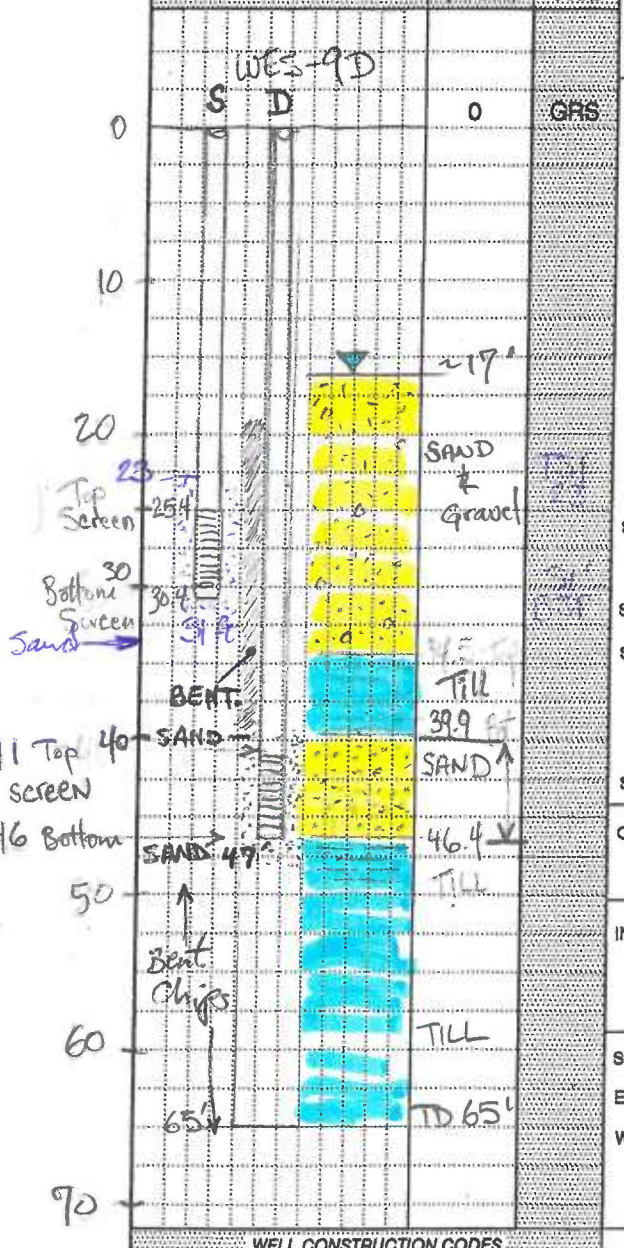
GEOLIS® Well Construction Form

COMPANY: WESTON
PROJECT: W. Vermont, IN
PROPERTY: 3938 W. Michigan St.
SITE/AREA: EPA Region 5 START

LOCATION ID: WES-9D
DATE: 2/7/2014
LOGGER: P. LANDRY
SIGNATURE:

START DATE: 2/6/2014
COMPLETION DATE: 2/8/2014
WELL STATUS: PMP - ABN - COL - NOR
STATUS DATE:

SURVEYED ELEVATIONS (MSL) | DEPTH TO WATER | DATE / TIME
GROUND LEVEL: _____ FT/M _____ FT/M(TOC) _____
MEASURING POINT: _____ FT/M _____ FT/M(TOC) _____
(TOP OF CASING) _____ FT/M(TOC) _____



WELL DIAGRAM - NOT TO SCALE | DEPTH (FT. BGS) | WELL CODE

WELL TYPE: (SCREEN) - MULT. SCREEN - OPEN HOLE - NESTED - PROBE - LYSIMETER
CASING: (SINGLE) - DOUBLE - TRIPLE COMPLETION: (FLUSH) - PROT - VAULT - CAP - NA
NUMBER OF SCREENS OR NESTED WELLS: 1 - 2 - 3 - 4 - 5 - OTH: _____
WELL USE: DOM - PUB - IRR - FIR - (MON) - HYD - EXT - DEW - RCH - VEW - INJ - OTH: _____

WELL DESIGN CONSTRUCTION

CASING #1 (INNERMOST): DIAMETER: 2 IN/CM INTERVAL: 0 TO 41 (FT/M BGS)
TYPE: (PVC) - STN - LCS - GAL - _____ SCHEDULE: 5 - 10 - 20 - (40) - 80 - _____
CASING JOINTS: FLT - BUT - EUT - SOL - WLD - (SCW) - CAM - OTH: _____

CASING #2: DIAMETER: _____ IN/CM INTERVAL: _____ TO _____ FT/M BGS
TYPE: PVC - STN - LCS - GAL - _____ SCHEDULE: 5 - 10 - 20 - 40 - 80 - _____

CASING #3 (OUTERMOST): DIAMETER: _____ IN/CM INTERVAL: _____ TO _____ FT/M BGS
TYPE: PVC - STN - LCS - GAL - _____ SCHEDULE: 5 - 10 - 20 - 40 - 80 - _____

STICK UP: INNER CASING: _____ FT/M OUTER CASING: _____ FT/M

GROUT: TYPE: CMT - C/B - BEN - HSB - OTH: _____
INTERVAL: _____ TO _____ FT/M BGS
PLACEMENT: TRM - PRS - (GRV) CENTRALIZERS: (NON) - 1 - 2 - 3 - OTH: _____

SEAL: * TYPE 1: Bent Chips INTERVAL: 19 TO 40 FT/M BGS
TYPE 2: Cement/Bent INTERVAL: 0 TO 19 FT/M BGS

SAND PACK: TYPE: med INTERVAL: 40 TO 46.5 FT/M BGS

SCREEN: DIAMETER: 2 IN/MM INTERVAL: 41 TO 46 FT/M BGS
TYPE: (PVC) - STAINLESS - TEFLON - CERAMIC - OTH: _____
SLOTS: CONTINUOUS - (SLOTTED/HORIZ) - SLOTTED/VERT - FIELD CUT
SLOT SIZE: 6 (10) 20 - 30 - 40 SLOT _____ IN/MM

SILT TRAP/SUMP: (YES) - NO INTERVAL: 45.7 TO 46 FT/M BGS (3-inch)

OPEN HOLE: DIAMETER 1: _____ IN/CM INTERVAL: _____ TO _____ FT/M BGS
DIAMETER 2: _____ IN/CM INTERVAL: _____ TO _____ FT/M BGS

INSIDE WELL T.D.: 46 FT/M BGS COLLAPSE/BACKFILL: COL - BFL - BTH - NON
COLLAPSE INTERVAL: 46 TO 47 FT/M BGS SAND
BACKFILL INTERVAL: 47 TO 65 FT/M BGS TYPE: Bent Chips

STRAT UNIT MONITORED: SAND Beneath 1st Till [ ] unit
ESTIMATED WELL YIELD: _____ GPM/LPM DRAWDOWN: _____ FT/M BMP

WELL PUMPS: YES - NO
TYPE 1: _____ DEPTH: _____ FT/M BMP
TYPE 2: _____ DEPTH: _____ FT/M BMP

WELL CONSTRUCTION CODES

GRS = GROUND SURFACE	TSC = TOP OF SCREEN
SPC = BOTTOM OF PROTECTIVE CASING	TST = TOP OF SILT TRAP
TBS = TOP OF BENTONITE SEAL	WTD = TOTAL DEPTH INSIDE WELL
TBR = TOP OF BEDROCK	BTD = BOREHOLE TOTAL DEPTH
BOC = BOTTOM OF OUTER CASING	TOC = TOP OF CASING (INNER)
TSP = TOP OF SAND PACK	BGS = BELOW GROUND SURFACE

COMMENTS: Shallow well set approx 10 ft east of deep well. Screen: 25.4'-30.4' Sand pack: 31-23 ft - Bentonite 20-6' Cement/Bentonit 6-20 ft.

GEOLIS Version 2.0 SEPT 1994 G050994

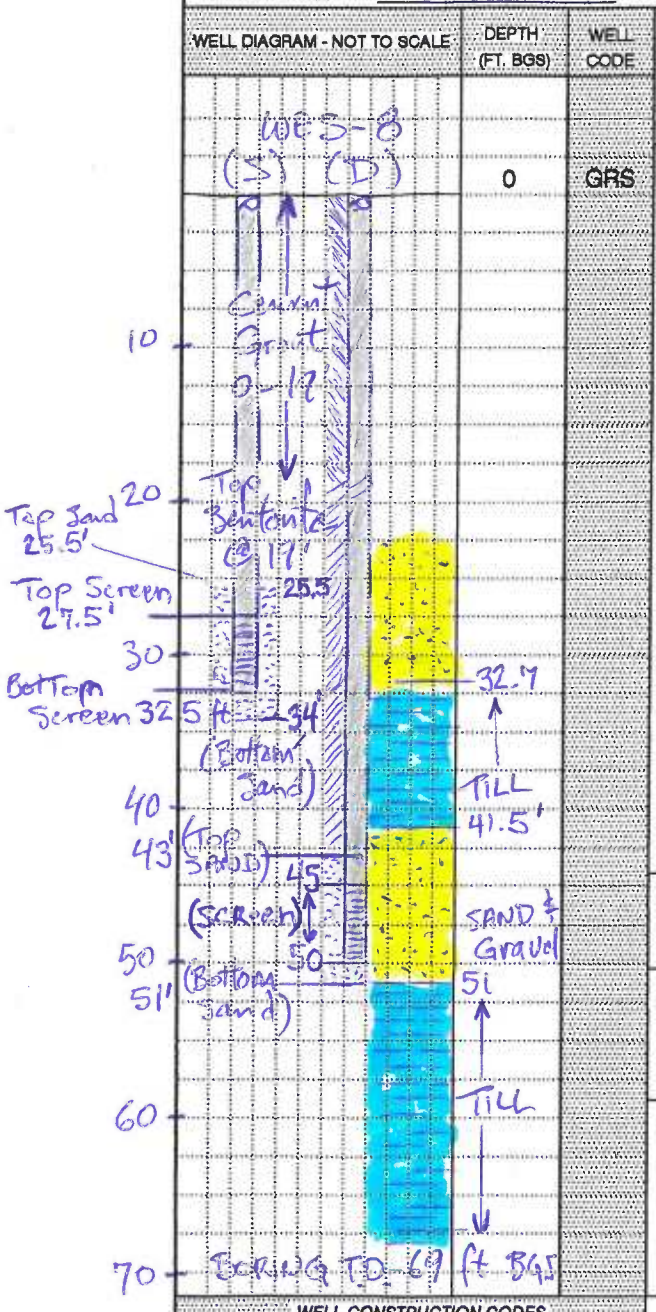
GEOLIS® Well Construction Form

COMPANY: WESTON
PROJECT: EPA REG 5 START
PROPERTY: 3938 W. Michigan Ave
SITE/AREA: W. Vermont / Indiana
LOCATION ID: WES-8 S/D
DATE: 2/10/2014 – 2/12/14
LOGGER: G. Glowoski
SIGNATURE:

START DATE: 2/10/14
COMPLETION DATE: 2/12/14
WELL STATUS: PMP - ABN - COL - (NOR)
STATUS DATE: 2/12/2014

SURVEYED ELEVATIONS (MSL)
GROUND LEVEL: _____ FT/M
MEASURING POINT: _____ FT/M (TOP OF CASING)

DEPTH TO WATER / DATE / TIME
_____ FT/M(TOC) _____
_____ FT/M(TOC) _____
_____ FT/M(TOC) _____



WELL DIAGRAM - NOT TO SCALE	DEPTH (FT. BGS)	WELL CODE
	0	GRS

WELL TYPE: (SCREEN) - MULT. SCREEN - OPEN HOLE - NESTED - PROBE - LYSIMETER
CASING: (SINGLE) DOUBLE - TRIPLE COMPLETION: FLUSH - PROT - VAULT - CAP - NA
NUMBER OF SCREENS OR NESTED WELLS: (1) 2 - 3 - 4 - 5 - OTH: _____
WELL USE: DOM - PUB - IRR - FIR - MON - HYD - EXT - DEW - RCH - VEW - INJ - OTH: Well Pairs

WELL DESIGN CONSTRUCTION

CASING #1 (INNERMOST): DIAMETER: 2 IN/CM INTERVAL: _____ TO _____ FT/M BGS
TYPE: PVC - STN - LCS - GAL - ____ SCHEDULE: 5 - 10 - 20 - 40 - 80 - ____
CASING JOINTS: FLT - BUT - EUT - SOL - WLD - SCW - CAM - OTH: _____

CASING #2: DIAMETER: _____ IN/CM INTERVAL: _____ TO _____ FT/M BGS
TYPE: PVC - STN - LCS - GAL - ____ SCHEDULE: 5 - 10 - 20 - 40 - 80 - ____

CASING #3 (OUTERMOST): DIAMETER: _____ IN/CM INTERVAL: _____ TO _____ FT/M BGS
TYPE: PVC - STN - LCS - GAL - ____ SCHEDULE: 5 - 10 - 20 - 40 - 80 - ____

STICK UP: INNER CASING: _____ FT/M OUTER CASING: _____ FT/M

GROUT: TYPE: CMT - C/B - BEN - HSB - OTH: _____
INTERVAL: _____ TO _____ FT/M BGS
PLACEMENT: TRM - PRS - GRV CENTRALIZERS: NON - 1 - 2 - 3 - OTH: _____

SEAL: TYPE 1: Cement INTERVAL: 0 TO 19 FT/M BGS
TYPE 2: Bentonite INTERVAL: 19 TO 43 FT/M BGS

SAND PACK: TYPE: medium INTERVAL: 43 TO 51 FT/M BGS

SCREEN: DIAMETER: 2 IN/MM INTERVAL: 45 TO 50 FT/M BGS
TYPE: (PVC) - STAINLESS - TEFLON - CERAMIC - OTH: _____
SLOTS: CONTINUOUS - (SLOTTED/HORIZ) - SLOTTED/VERT - FIELD CUT
SLOT SIZE: 6 - (10) - 20 - 30 - 40 SLOT _____ IN/MM

SILT TRAP/SUMP: YES - NO INTERVAL: _____ TO _____ FT/M BGS

OPEN HOLE: DIAMETER 1: _____ IN/CM INTERVAL: _____ TO _____ FT/M BGS
DIAMETER 2: _____ IN/CM INTERVAL: _____ TO _____ FT/M BGS

INSIDE WELL T.D.: _____ FT/M BGS COLLAPSE/BACKFILL: COL - BFL - BTH - NON
COLLAPSE INTERVAL: _____ TO _____ FT/M BGS
BACKFILL INTERVAL: _____ TO _____ FT/M BGS TYPE: _____

STRAT UNIT MONITORED: SAND BENEATH 1st Till
ESTIMATED WELL YIELD: _____ GPM/LPM DRAWDOWN: _____ FT/M BMP
WELL PUMPS: YES - NO
TYPE 1: _____ DEPTH: _____ FT/M BMP
TYPE 2: _____ DEPTH: _____ FT/M BMP

COMMENTS: Shallow well screened 27.5-32.5 Sand-packed 34-25.5 ft; Bentonite 25.5-20 ft; cement to surface.

WELL CONSTRUCTION CODES

GRS = GROUND SURFACE	TSC = TOP OF SCREEN
BPC = BOTTOM OF PROTECTIVE CASING	TST = TOP OF SILT TRAP
TBS = TOP OF BENTONITE SEAL	WTD = TOTAL DEPTH INSIDE WELL
TBR = TOP OF BEDROCK	BTD = BOREHOLE TOTAL DEPTH
BOC = BOTTOM OF OUTER CASING	TOC = TOP OF CASING (INNER)
TSP = TOP OF SAND PACK	BGS = BELOW GROUND SURFACE

GEOLIS® Well Construction Form

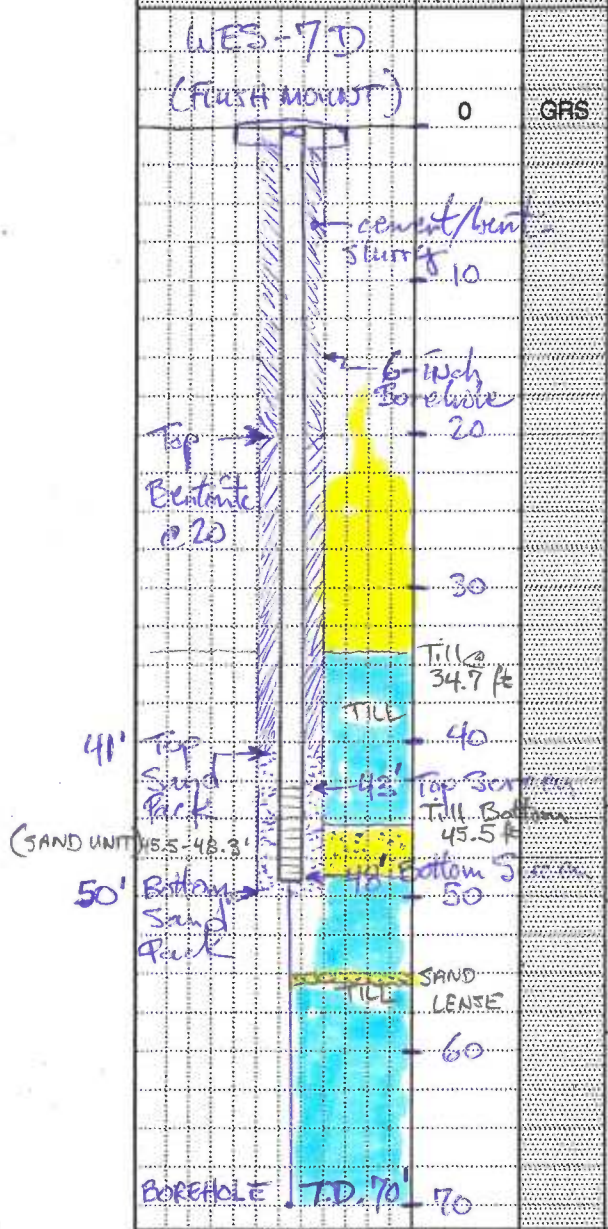
COMPANY: WESTON
PROJECT: EPA Region 5 START
PROPERTY:
SITE/AREA: W. Vermont / Indiana

LOCATION ID: WES-7
DATE: 2/14/2014
LOGGER: G. Rousso3
SIGNATURE:

START DATE: 2/13/2014
COMPLETION DATE: 2/14/2014
WELL STATUS: PMP - ABN - COL - (NOR)
STATUS DATE:

SURVEYED ELEVATIONS (MSL)
GROUND LEVEL: _____ FT/M
MEASURING POINT (TOP OF CASING): _____ FT/M

DEPTH TO WATER / DATE / TIME
_____ FT/M(TOC) _____
_____ FT/M(TOC) _____
_____ FT/M(TOC) _____



WELL DIAGRAM - NOT TO SCALE	DEPTH (FT. BGS)	WELL CODE

WELL TYPE: (SCREEN) - MULT. SCREEN - OPEN HOLE - NESTED - PROBE - LYSIMETER
CASING: (SINGLE) - DOUBLE - TRIPLE COMPLETION: (FLUSH) - PROT - VAULT - CAP - NA
NUMBER OF SCREENS OR NESTED WELLS: 1 - 2 - 3 - 4 - 5 - OTH: —
WELL USE: DOM - PUB - IRR - FIR - (MON) - HYD - EXT - DEW - RCH - VEW - INJ - OTH: _____

WELL DESIGN CONSTRUCTION

CASING #1 (INNERMOST): DIAMETER: (2) IN/CM INTERVAL: 0 TO 43 FT/M BGS
TYPE: (PVC) - STN - LCS - GAL - _____ SCHEDULE: 5 - 10 - 20 - (40) - 80 - _____
CASING JOINTS: FLT - BUT - EUT - SOL - WLD - (SCW) - CAM - OTH: _____

CASING #2: DIAMETER: _____ IN/CM INTERVAL: _____ TO _____ FT/M BGS
TYPE: PVC - STN - LCS - GAL - _____ SCHEDULE: 5 - 10 - 20 - 40 - 80 - _____

CASING #3 (OUTERMOST): DIAMETER: _____ IN/CM INTERVAL: _____ TO _____ FT/M BGS
TYPE: PVC - STN - LCS - GAL - _____ SCHEDULE: 5 - 10 - 20 - 40 - 80 - _____

STICK UP: INNER CASING: _____ FT/M OUTER CASING: _____ FT/M

GROUT: TYPE: CMT - C/B - BEN - HSB - OTH: _____
INTERVAL: _____ TO _____ FT/M BGS
PLACEMENT: TRM - PRS - GRV CENTRALIZERS: NON - 1 - 2 - 3 - OTH: _____

SEAL: TYPE 1: Bentonite INTERVAL: 41 TO 20 FT/M BGS
TYPE 2: Cement/Bent INTERVAL: 20 TO 0 FT/M BGS

SAND PACK: TYPE: medium INTERVAL: 41 TO 50 FT/M BGS

SCREEN: DIAMETER: 2 IN/MM INTERVAL: 43 TO 48 FT/M BGS
TYPE: PVC - STAINLESS - TEFLON - CERAMIC - OTH: _____
SLOTS: CONTINUOUS (SLOTTED/HORIZ) - SLOTTED/VERT - FIELD CUT
SLOT SIZE: 6 - (10) - 20 - 30 - 40 SLOT _____ IN/MM

SILT TRAP/SUMP: YES - NO INTERVAL: _____ TO _____ FT/M BGS

OPEN HOLE: DIAMETER 1: _____ IN/CM INTERVAL: _____ TO _____ FT/M BGS
DIAMETER 2: _____ IN/CM INTERVAL: _____ TO _____ FT/M BGS

INSIDE WELL T.D.: 48 (FT/M BGS) COLLAPSE/BACKFILL: COL - BFL - BTH - (NON)
COLLAPSE INTERVAL: _____ TO _____ FT/M BGS
BACKFILL INTERVAL: _____ TO _____ FT/M BGS TYPE: _____

STRAT UNIT MONITORED: SAND below 1st Till
ESTIMATED WELL YIELD: ~ 2 (GPM/LPM) DRAWDOWN: _____ FT/M BMP
WELL PUMPS: YES - NO
TYPE 1: _____ DEPTH: _____ FT/M BMP
TYPE 2: _____ DEPTH: _____ FT/M BMP

COMMENTS: Only 3rd deep well in the sand/gravel unit below the 1st Till unit.

WELL CONSTRUCTION CODES

GRS = GROUND SURFACE	TSC = TOP OF SCREEN
BPC = BOTTOM OF PROTECTIVE CASING	TST = TOP OF SILT TRAP
TBS = TOP OF BENTONITE SEAL	WTD = TOTAL DEPTH INSIDE WELL
TBR = TOP OF BEDROCK	BTD = BOREHOLE TOTAL DEPTH
BOC = BOTTOM OF OUTER CASING	TOC = TOP OF CASING (INNER)
TSP = TOP OF SAND PACK	BGS = BELOW GROUND SURFACE

WESTON SOLUTIONS, INC.			Drilling/Lithologic Log	PAGE 1 OF 2	
Job Name	West Vermont St.	Boring No.	WES-6	Groundwater Levels	
Job No.	20405.012.001.1856.00	Well Type	Monitoring	Date	Depth
Date Drilled	Feb. 3-4, 2014	Drilling Method	RotaSonic		
Drilling Co.	Layne-Christianson	Completion Depth	69.5 (ft bgs)		
Drill Foreman	Tom Devik	Location	Speedway, IN		
Logged By	P. Landry/G. Roussos	Drill Rig Type	Roussy Sonicor 50K		

Depth ft BGS	USCS Class	Sample Interval	% Rec.	Visual Description	FID/OVA HEATED HEADSPACE
	OL	0-7 ft	4.2'	0-1.2 ft: **Top soil**, med-dark brown silty clay, some sand, root material common, soft, damp-moist. 1.2-4.2 ft; Gray brown **silty clay** with 20% sand, 10% gravel, sand med-fine grain, fine gravel, grades to brown, dense sandy silt with angular gravel at 3.2 ft, dry.	
10	SM/SW	7-9.5 ft	100	7-7.4 ft: Orange brown clayey sand, soft moist. 7.4-9.2 ft: Orange medium-fine grained sand with some silt and occasional angular gravel (~10%), loose, damp-dry, minor dense silty clay lenses. 9.2-9.5 ft: poorly sorted **sandy gravel**, sub round-ang, dry	
	SW	9.5-12 ft	100	as/above; loose, silty sand with 10% gravel/cobbles 1/4-1/2-in round-sub round gravels, sand is fine-med grained, alternate layers of gravel, dry.	
15	SW/SM	12-14 ft	100	12-14.8 ft: Med-light orange brown gravelly, silty sand with angular-rounded gravel (1/4-1/2-inch diam), sand is med-coarse, dry, loose.	
	ML	14-16 ft	100	14.8-15.3 ft: Dense, brown, **gravelly silty till,** 10-20% grav, coarse-fine, angular-sub rounded, non-plast, incr sand at depth (10-20%), fine-very fine grained within silt, dry.	
	GW/GM			15.3-16 ft:Poorly sorted **sandy, silty, coarse to fine gravels,** angular to round, becoming more uniform loose sand with depth, dry.	
20	SW/SM	16-19 ft	100	16-19 ft: Uniform gray to orange brown gravelly sand, med to coarse sand with 5-10% rounded gravel, wet at 17 ft, little to trace silt, soft-loose.	
	SW/SM	19.5-29.5	100	19-26.5 ft: Poorly sorted, orange brown gravelly sand, fine to coarse grained sand with 30% med-coarse gravels, loose, tr to 10% silt, wet, loose. 26.5-29.5 ft: as/above; distinct color change to med-dark gray gravelly sand, wet, loose, 10% silt, little-trace clay.	

WESTON SOLUTIONS, INC.			Drilling/Lithologic Log	PAGE 2 OF 2	
Job Name	West Vermont St.	Boring No.	WES-6	Groundwater Levels	
Job No.	20405.012.001.1856.00	Well Type	Monitoring	Date	Depth
Date Drilled	Feb. 3-4, 2014	Drilling Method	RotaSonic		
Drilling Co.	Layne-Christianson	Completion Depth	69.5 (ft bgs)		
Drill Foreman	Tom Devik	Location	Speedway, IN		
Logged By	P. Landry/G. Roussos	Drill Rig Type	Roussy Sonicor 50K		

Depth ft BGS	USCS Class	Sample Interval	% Rec.	Visual Description	FID/OVA HEATED HEADSPACE
30	SW	29.5-39.5 ft	95	29.5-33.7 ft: as/above, loose, wet **sandy gravel**, med gray, poorly sorted fine-coarse sand with coarse to fine gravels, cobbles with little-10% silts.	
	CL			33.7-38.9 ft: Very dense, gray-dark **gray silty clay Till** with gravel float common, fine-coarse gravel, silty clay, moist-dry, trace fine sand.	
				38.9-39.1 ft: as/above, with very thin med-coarse sand lense 1/4-inch thin, dominantly **clayey silt till**, moist-damp.	
40	ML/CL	39.1-46.1 ft	100	39.1-43.7: as/above, dark gray **clayey, silty Till with gravel** float, med-coarse gravel, med plasticity, damp-dry.	
	SW/SM			43.7-45.2 ft; **Silty, gravelly gray sand** with trace-10% clay/silt	
	ML/CL			45.2-46.1 ft: Back into dense **clayey silt Till** with 10% gravel float, med-dark gray, trace fine sand, moist-damp.	
	ML/CL	46.1-49.1	100	46.1-49.1 ft: as/above, clayey silt till with minor gravel float, very dense, med gray, uniform, minor to trace sand <10%, dry	
50		49.1-56.1 ft	100	as/above, dark gray, dense clayey silt Till, minor gravel float (10%), mostly dry-damp, gravel is angular to round.	
		56.1-59.1	100	as/above, dark gray, dense clayey silt till to silty clay with minor gravel float, rounded-angular gravels, med-coarse, dry.	
60		59.5-69.5	100	as/above, dense dark gray clayey silt Till with gravel float, fine to coarse gravel, angular to rounded, till is mostly dense-hard with trace sand.	
				Boring TD is 69.5 ft bgs.	

WESTON SOLUTIONS, INC.			Drilling/Lithologic Log PAGE 1 OF 2		
Job Name	West Vermont St.	Boring No.	WES-7	Groundwater Levels	
Job No.	20405.012.001.1856.00	Well Type	Monitoring	Date	Depth
Date Drilled	Feb. 13-14, 2014	Drilling Method	RotaSonic		
Drilling Co.	Layne-Christianson	Completion Depth	70.0 (ft bgs)		
Drill Foreman	Tom Devik	Location	Speedway, IN		
Logged By	Greg Roussos	Drill Rig Type	Roussy Sonicor 50K		

Depth ft BGS	USCS Class	Sample Interval	% Rec.	Visual Description	FID/OVA HEATED HEADSPACE
	OL	0-5 ft	80	0-1.3 ft: Medium brown dry **silty sand with gravel,** organic soil with plant material	
	CL			1.3-2.8 ft: Red brown loamy clay with gravel float, dry	
	SM			2.8-3.0 ft: Medium brown **sand and gravel,** dry	
	SM/SW	5-10 ft	87	5-5.8 ft: Brown clayey **sand with some gravel**, dry	
				5.8-9.3 ft: Medium brown **sand and gravel**, dry.	
10		10-15 ft	80	10-10.4 ft: Medium brown **clayey sand**, some gravel.	
				10.4-13 ft: Medium brown sand and gravel, well sorted, no fines	
				13-13.3 ft: Medium brown **clayey silt**, dry, some gravel float.	
15	SM/SW	15-20 ft	93	15-15.75 ft: Brown sand and gravel as above.	
	CL			15.75-17.1 ft: Gray **silty clay with gravel** float, dry.	
	SW			17.1-19.1 ft: Medium brown sand and gravel, dry.	
				19.1-19.6 ft: Medium brown **silty clay with gravel,** moist.	
20	SW	20-30 ft	53	20-22 ft: Medium brown sandy gravel, wet.	
				22-25.25 ft: Gray brown sand and gravel, wet.	

WESTON SOLUTIONS, INC.			Drilling/Lithologic Log	PAGE 2 OF 2	
Job Name	West Vermont St.	Boring No.	WES-7	Groundwater Levels	
Job No.	20405.012.001.1856.00	Well Type	Monitoring	Date	Depth
Date Drilled	Feb. 13-14, 2014	Drilling Method	RotaSonic		
Drilling Co.	Layne-Christianson	Completion Depth	70.0 (ft bgs)		
Drill Foreman	Tom Devik	Location	Speedway, IN		
Logged By	Greg Roussos	Drill Rig Type	Roussy Sonicor 50K		

Depth ft BGS	USCS Class	Sample Interval	% Rec.	Visual Description	FID/OVA HEATED HEADSPACE
30	SW	30-40 ft	71	30-34.7 ft: Gray brown sand and gravel as above, wet.	
	CL			34.7-37.1 ft: **Till**, hard, gray clay with gravel float.	
40	ML/CL	40-47 ft	100	40-43 ft: as/above, dense **Till,** Dry	
	SW/SM				
	ML			43-45.5 ft: clayey gray brown silt, moist, soft.	
	SW/SM			45.5-47 ft: Gray brown sand, well sorted, little gravel, wet	
	SM	47-50 ft	100	47-48.3 ft: As/above, well sorted sand and gravel, wet	
50	ML/CL			48.3-50 ft: hard gray **clayey Till**, dry, some-minor gravel.	
	ML/CL	50-56 ft	100	50-55.3 ft: Dense Till as/above.	
	SM			55.3-55.7 ft: Gray **sand** lense**, wet.**	
				55.7-56 ft: Dense, gray **Till** as/above.	
	ML/CL	56-60 ft	100	56-60 ft: same as/above, dense, medium gray Till, dry.	
60	ML/CL	60-64 ft	100	60-64 ft: same as/above. Dense, gray **Till** with some gravel float, very dry.	
	ML/CL	64-70 ft	100	64-70 ft: same as/above. Dense, gray **Till, clayey silt** with minor gravel float, thin 1-inch clayey sand lense at 64.25 ft.	
				Boring TD is 70 ft bgs.	

WESTON SOLUTIONS, INC.			Drilling/Lithologic Log PAGE 1 OF 2		
Job Name	West Vermont St.	Boring No.	WES-8	Groundwater Levels	
Job No.	20405.012.001.1856.00	Well Type	Monitoring	Date	Depth
Date Drilled	Feb. 10-11, 2014	Drilling Method	RotaSonic		
Drilling Co.	Layne-Christianson	Completion Depth	69.0 (ft bgs)		
Drill Foreman	Tom Devik	Location	Speedway, IN		
Logged By	Greg Roussos	Drill Rig Type	Roussy Sonicor 50K		

Depth ft BGS	USCS Class	Sample Interval	% Rec.	Visual Description	FID/OVA HEATED HEADSPACE
	OL	0-5 ft	80	0-3.25 ft: Medium brown **clay**, some gravel, trace sand, damp 3.25-4 ft: Medium brown **sand and gravel**, dry	
	SM/SW	5-9 ft	92	5-9 ft: Medium brown **sand & gravel**, damp-dry, grades to heavy gravel at 9 ft.	
10	SW/SM CL	9-15 ft	61	9-12 ft: as/above to 12 ft, becoming orange in color. 12-12.66 ft: Medium gray **silty clay** with minor gravel float, moist	
15	SM/SW CL	15-20 ft	100	15-16 ft: Medium brown clayey **sand & gravel,** damp. 16-18 ft: Medium gray **sandy gravelly clay**, damp, grades to medium brown.	
	SW			18-20 ft: Medium brown sand & gravel, wet, sand becoming coarser with depth.	
20	SW	20-30 ft	72	20-27.25 ft: Medium gray **sand & gravel**, trace clay, wet	

WESTON SOLUTIONS, INC.			Drilling/Lithologic Log PAGE 2 OF 2		
Job Name	West Vermont St.	Boring No.	WES-8	Groundwater Levels	
Job No.	20405.012.001.1856.00	Well Type	Monitoring	Date	Depth
Date Drilled	Feb. 10-11, 2014	Drilling Method	RotaSonic		
Drilling Co.	Layne-Christianson	Completion Depth	69.0 (ft bgs)		
Drill Foreman	Tom Devik	Location	Speedway, IN		
Logged By	Greg Roussos	Drill Rig Type	Roussy Sonicor 50K		

Depth ft BGS	USCS Class	Sample Interval	% Rec.	Visual Description	FID/OVA HEATED HEADSPACE
30	SW	30-40 ft	88	30-32.7 ft: same as/above, gray **sand & gravel**.	
	CL			32.7-37.25 ft: **Till**, greenish gray, silty clay with minor gravel float, dry	
40	ML/CL	40-46 ft	92	40-41.5 ft: as/above, **Till**. Dry	
	SW/SM			41.5-43.5 ft: Fine to medium grained **sand** grading to coarse sand, medium brown, wet.	
	ML			43.5-43.9 ft: medium gray Silt lense with minor fine gravel,	
	SW/SM			43.9-45.5 ft: Medium gray fine to coarse **sand with gravel**, wet.	
	SW	46-50 ft	90	46-49.6 ft: same as/above, medium gray fine to coarse sand with some gravel, wet.	
50	ML/CL	50-55 ft	100	50-51 ft: as/above, sand with gravel, medium gray, wet. 51-55 ft: **Till**, hard, medium gray clayey silt, damp, gravel float.	
	ML/CL	55-60 ft	100	55-60 ft: same as/above, dense, medium gray Till, clayey silt, little to trace fine gravel float, dry	
60	ML/CL	60-64 ft	100	60-64 ft: same as/above. Dense, gray **Till, clayey silt** with minor gravel float.	
	ML/CL	64-69 ft	100	64-69 ft: same as/above. Dense, gray **Till, clayey silt** with minor gravel float.	
				Boring TD is 69 ft bgs.	

WESTON SOLUTIONS, INC.			Drilling/Lithologic Log	PAGE 1 OF 2	
Job Name	West Vermont St.	Boring No.	WES-9	Groundwater Levels	
Job No.	20405.012.001.1856.00	Well Type	Monitoring	Date	Depth
Date Drilled	Feb. 6-7, 2014	Drilling Method	RotaSonic		
Drilling Co.	Layne-Christianson	Completion Depth	65.0 (ft bgs)		
Drill Foreman	Tom Devik	Location	Speedway, IN		
Logged By	P. Landry/F. Beodray	Drill Rig Type	Roussy Sonicor 50K		

Depth ft BGS	USCS Class	Sample Interval	% Rec.	Visual Description	FID/OVA HEATED HEADSPACE
	OL	0-5 ft	100	0-1.5 ft: **Top soil**, med-gray brown clayey silt, little-tr gravel, plant and root material, uniform, damp-moist. 1.5-5 ft; Medium gray brown **clayey silt** as above with increased sand and fine gravel at 3.2 ft, dry-damp, soft	
	SM/SW	5-7.5 ft	100	5-7.5 ft: Medium brown silty clay with 20% sand, 10% grav as above grading to silty sand & gravel at 6.9 ft, poorly sorted	
10		7.5-10 ft	100	7.5-10 ft; Orange brown silty sand with 20% gravel, 10% silt, loose, dry.	
	SW	10-13.5	100	10-10.3 ft: as/above, silty sand with gravel. 10.3-11.5 ft: Orange brown, dense silt with gravel. 11.5-13.5 ft: Loose gravelly sand, fine to coarse gravel, poorly sorted, round-angular gravel with 20% silt and trace clay.	
15	SW/SM ML SW	13.5-18 ft	100	13.5-13.7 ft: as/above, gravelly sand. 13.7-14.4 ft: brown silty till with 10% gravel, 10% sand, fine, gravel is angular, soft, damp to 14.4 ft. 14.4-18 ft: Gray brown gravelly sand, 80% loose med sand, well sorted, 10% med gravel, wet.	
		18-20 ft	0	(no sample recovered)	
20	SW SW/SM	20-30 ft	100	20-24.5 ft: Orange brown gravelly sand as above, wet, loose, poorly sorted, fine-coarse grained, gravel 20%, little fines. 24.5-30 ft: Medium gray-dark gray gravelly sand with minor silt (<10%), loose, wet.	

WESTON SOLUTIONS, INC.			Drilling/Lithologic Log	PAGE 2 OF 2	
Job Name	West Vermont St.	Boring No.	WES-9	Groundwater Levels	
Job No.	20405.012.001.1856.00	Well Type	Monitoring	Date	Depth
Date Drilled	Feb. 6-7, 2014	Drilling Method	RotaSonic		
Drilling Co.	Layne-Christianson	Completion Depth	65.0 (ft bgs)		
Drill Foreman	Tom Devik	Location	Speedway, IN		
Logged By	P. Landry/F. Beodray	Drill Rig Type	Roussy Sonicor 50K		

Depth ft BGS	USCS Class	Sample Interval	% Rec.	Visual Description	FID/OVA HEATED HEADSPACE
30	SW	30-39 ft	100	30-31 ft: as above, gravelly med-coarse sand, 10% silt. 31-34.5 ft: loose sand with 80% gravel, trace silt, poorly sorted, grades to coarse gray sand with 20-30% fine-coarse gravel.	
	CL/ML			34.5-39 ft: Dense, gray **Till, clayey silt** with trace crse gravel float, med-dark gray, minor intermittent fine-med sand (10%), top of till was moist grading to damp-dry within top 1-2 ft, clay and silt content increases with depth, gravel float pea sized.	
40	ML/CL	39-49 ft	100	39-39.9 ft: as above, dense clay silt till with gravel float, dry. 39.9-46.4 ft: medium-light gray, uniform Sand, well sorted, dominantly med grained with some fine grained sand, grades to coarse sand at 44.4 ft.	
	SW/SM				
	ML/CL			46.4-49 ft: medium-dark gray **clayey silt till** with trace med-fine gravel, damp.	
	ML/CL	49-58 ft	100	49-58 ft: as above, dense gray **silty clay till**, damp-dry, 10% med-fine gravel float; thin 1/4-inch fine-med sand lenses between 49.5-53 ft, 10-20%.	
50					
	ML/CL	58-65 ft	100	58-65 ft: as above, dense, dark-med gray silt till with mino to trace med gravel, angular-sub rounded, dry.	
60					
				Boring TD is 65 ft bgs.	

Legend

Well Location

N

UTM NAD83 (16N)

0 50 100 ft

Prepared For:
US EPA REGION V
Contract No.: EP-S5-06-04
TDD: S05-0001-1205-013
DCN: 1856-2A-BBKP

Prepared By:
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Layne Drilling
Well Locations
Completed February 2013

West Vermont Street
Speedway, Marion County, Indiana

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